



Centre No.					Surname	Initial(s)
Candidate No.					Signature	

Paper Reference

**4437/2F**

Examiner's use only

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# **London Examinations IGCSE Science (Double Award)**

Team Leader's use only

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## **Chemistry**

Paper 2F

# **Foundation Tier**

Monday 8 May 2006 – Morning

Time: 1 hour 15 minutes

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total	

**Materials required for examination**

Nil

**Items included with question papers**

Nil

**Instructions to Candidates**

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.  
 The paper reference is shown at the top of this page. Check that you have the correct question paper.  
 Answer **ALL** the questions in the spaces provided in this question paper.  
 Show all the steps in any calculations and state the units.  
 Calculators may be used.

**Information for Candidates**

The total mark for this paper is 75. The marks for parts of questions are shown in round brackets: e.g. (2).  
 A Periodic Table is given on page 2.  
 This paper has 9 questions. All blank pages are indicated.

**Advice to Candidates**

Write your answers neatly and in good English.

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**Turn over**

# THE PERIODIC TABLE

Period 1 2 3 4 5 6 7 0

Group

Period

1																	4 <b>He</b> Helium 2
2	7 <b>Li</b> Lithium 3															19 <b>F</b> Fluorine 9	20 <b>Ne</b> Neon 10
3	11 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12													35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18	
4	19 <b>K</b> Potassium 19	39 <b>Ca</b> Calcium 20													79 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36	
5	37 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	45 <b>Sc</b> Scandium 21	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	63.5 <b>Cu</b> Copper 29	70 <b>Ga</b> Gallium 31	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54				
6	87 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	89 <b>Y</b> Yttrium 39	99 <b>Tc</b> Technetium 43	103 <b>Rh</b> Rhodium 45	108 <b>Ag</b> Silver 47	115 <b>In</b> Indium 49	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	222 <b>Rn</b> Radon 86				
7	119 <b>Fr</b> Francium 87	226 <b>Ra</b> Radium 88	139 <b>La</b> Lanthanum 57	186 <b>Re</b> Rhenium 75	192 <b>Ir</b> Iridium 77	197 <b>Au</b> Gold 79	204 <b>Tl</b> Thallium 81	208 <b>Pb</b> Lead 82	210 <b>Po</b> Polonium 84	210 <b>Po</b> Polonium 84	210 <b>Po</b> Polonium 84	210 <b>Po</b> Polonium 84	210 <b>Po</b> Polonium 84	210 <b>Po</b> Polonium 84			

1  
**H**  
Hydrogen  
1

Key

Relative atomic  
mass  
Symbol  
Name  
Atomic number



**SECTION A**

1. This question is about the Periodic Table on page 2.

(a) Tick (✓) **one** box to show the order in which elements are arranged in the Periodic Table.

- alphabetical
- atomic number
- reactivity
- relative atomic mass

(1)

(b) Which element has an atomic number that is the same as its relative atomic mass?

.....

(1)

(c) Which element is in both Period 3 and Group 4?

.....

(1)

(d) In Period 2, which element has atoms with the smallest number of neutrons?

.....

(1)

(e) How many metals are there in Period 3?

.....

(1)

Q1

(Total 5 marks)



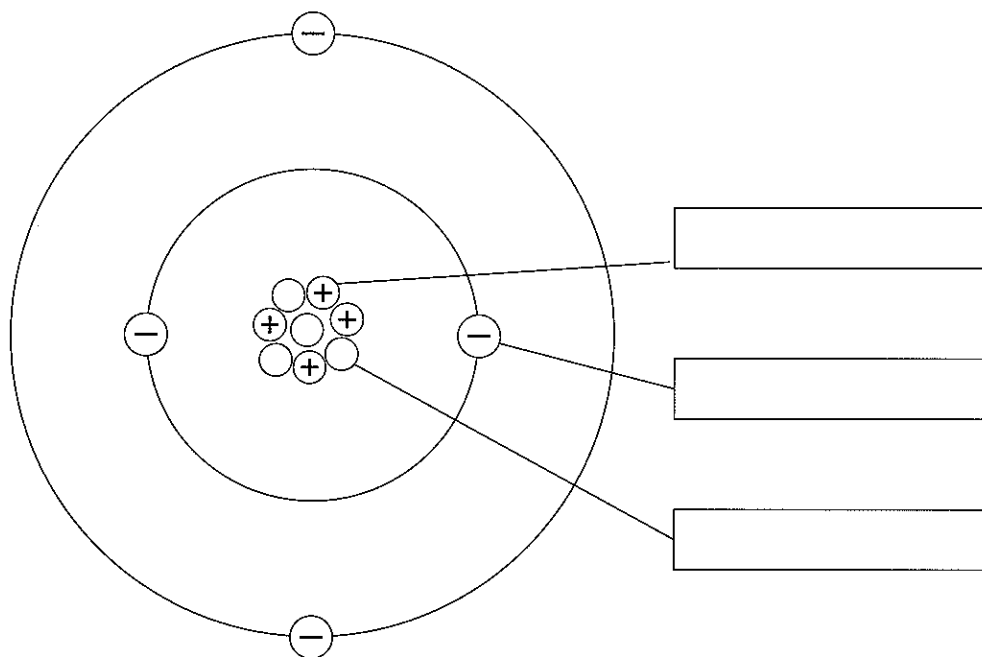
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2. This question is about atoms.

(a) (i) Choose words from the box to label the diagram of an atom.

electron	ion
neutron	proton



(3)

(ii) What is the mass number of this atom?

.....  
(1)

(iii) Which element is composed of atoms like this? Use the Periodic Table on page 2.

.....  
(1)

(b) Chlorine has two isotopes. Give one way in which atoms of the two isotopes are similar .....

.....

different .....

.....

(2)

Q2

(Total 7 marks)



3. A student adds small pieces of magnesium to dilute hydrochloric acid in a test tube. Hydrogen gas is produced.

(a) (i) What does the student see as the magnesium reacts?

..... (1)

(ii) The reaction is exothermic. What happens to the temperature of the acid during the reaction?

..... (1)

(iii) Write a word equation for the reaction.

..... (1)

(b) Describe the test for hydrogen.

Test .....

Result .....

(2)

(c) Tick (✓) three boxes to show how the student could make the reaction faster without changing the mass of the magnesium.

add water to the acid

cool the acid

increase the concentration of the acid

powder the magnesium before use

use a boiling tube instead of a test tube

use one large piece of magnesium

use warmer acid

(3)

Q3

(Total 8 marks)



4. (a) Complete the table to show whether each substance is an element or a compound and whether its particles are ionically or covalently bonded.

Name of substance	Element or compound	Bonding (ionic or covalent)
diamond	element	covalent
graphite	element	covalent
iodine		
magnesium oxide		
hydrogen chloride		

(4)

- (b) Both diamond and graphite are forms of carbon. What is the name given to different forms of the same element in the same state?

.....

(1)

- (c) What is the physical state of iodine at room temperature?

.....

(1)

Q4

(Total 6 marks)



5. The table gives the displayed formulae of some organic compounds.

Compound	Displayed formula
A	$  \begin{array}{cccc}  \text{H} & & \text{H} & \text{H} \\    & &   &   \\  \text{C} & = & \text{C} & - \text{C} & - \text{C} & - \text{H} \\    & &   &   &   \\  \text{H} & & \text{H} & \text{H} & \text{H}  \end{array}  $
B	$  \begin{array}{cccc}  & \text{H} & & \text{H} \\  &   & &   \\  \text{H} & - \text{C} & - & \text{C} & - \text{O} & - \text{H} \\  &   & &   \\  & \text{H} & & \text{H}  \end{array}  $
C	$  \begin{array}{cccc}  & \text{H} & & \text{H} \\  &   & &   \\  \text{H} & - \text{C} & - & \text{C} & - \text{H} \\  &   & &   \\  & \text{H} & & \text{H}  \end{array}  $
D	$  \begin{array}{cccc}  & \text{H} & & \text{H} & & \text{H} & & \text{H} \\  &   & &   & &   & &   \\  \text{H} & - \text{C} & - & \text{C} & = & \text{C} & - & \text{C} & - \text{H} \\  &   & & & & & &   \\  & \text{H} & & & & & & \text{H}  \end{array}  $
E	$  \begin{array}{cccc}  & \text{H} & & \text{H} \\  &   & &   \\  \text{H} & - \text{C} & - & \text{C} & - \text{H} \\  &   & &   \\  & \text{Br} & & \text{Br}  \end{array}  $

(a) From the table select the letter(s) of

(i) **all** compounds that are hydrocarbons

..... (1)

(ii) **one** compound that is saturated

..... (1)

(iii) **two** compounds that are isomers of each other.

..... (1)





(b) Name the homologous series to which compound A belongs.

.....  
(1)

(c) Give the general formula of the homologous series to which compound C belongs.

.....  
(1)

(d) Describe a simple test to show the difference between compounds A and C.

Test .....

Result with A .....

Result with C .....

(e) Calculate the relative formula mass of compound B.

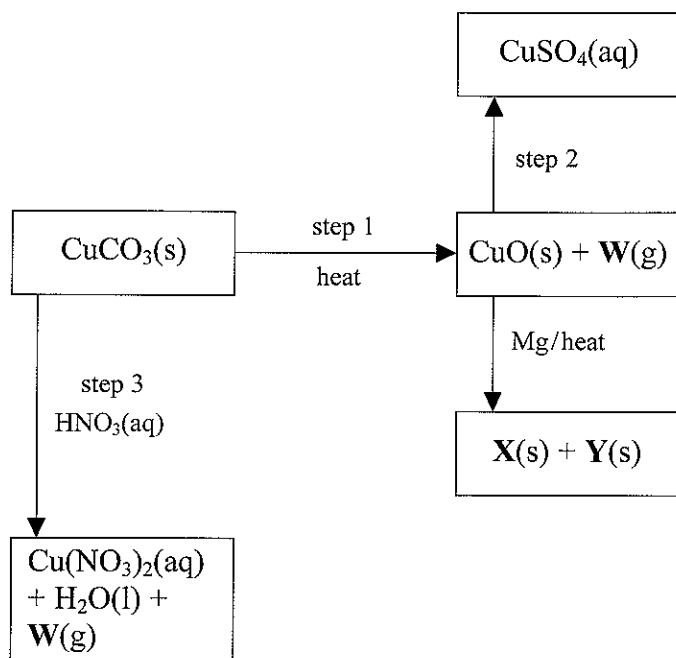
.....  
(1)

(Total 9 marks)

Q5



6. The flow chart shows some reactions involving copper compounds.



(a) Give the meanings of the state symbols in the flow chart.

State symbol	Meaning
(aq)	
(g)	
(s)	

(3)

(b) (i) What colour change would you see during step 1?

.....  
(2)

(ii) Give the name of gas **W** which is made in steps 1 and 3.

.....  
(1)

(c) Give the name of the reagent which has the formula  $\text{HNO}_3(\text{aq})$ .

.....  
(1)



(d) Magnesium is more reactive than copper. When copper(II) oxide is heated with magnesium, substances X and Y are made. Identify X and Y.

X .....

Y .....

(2)

(e) Identify the acid that reacts with CuO in step 2.

.....

(1)

(Total 10 marks)

Q6

**TOTAL FOR SECTION A: 45 MARKS**



**SECTION B**

7. Some metals react with cold water to form a solution of the metal hydroxide and a gas.

(a) How many electrons are in the outer shell of an atom of these metals?

Sodium .....

Magnesium .....

(2)

(b) (i) Write a **word** equation for the reaction between sodium and water.

.....

.....

(1)

(ii) Describe **two** observations that you could make during this reaction.

1 .....

.....

2 .....

.....

(2)

(c) Litmus is used to test for one of the products of this reaction.

(i) What type of substance is litmus?

.....

(1)

(ii) How does it show that this product is present?

.....

(1)



(d) Magnesium reacts very slowly with cold water but more quickly when it is heated in steam, forming an oxide instead of a hydroxide.

(i) Write a chemical equation for the reaction of magnesium with steam.

.....  
(1)

(ii) What colour is the oxide formed?

.....  
(1)

(e) The reactivities of sodium, potassium and magnesium are different. State which of the three is the

most reactive .....

least reactive .....

(2)

(Total 11 marks)

Q7



8. Crude oil is a source of useful chemicals.

(a) Complete the sentence.

Most of the compounds in crude oil are composed of the elements

..... and ..... (1)

(b) During refining, crude oil is first separated into fractions.

(i) What is the name of the process used to obtain fractions from crude oil?

..... (1)

(ii) What is meant by the term **fraction**?

.....  
..... (1)

(iii) Describe how the fractions are obtained.

.....  
.....  
.....  
.....  
.....  
..... (3)



(c) Many substances obtained from the fractions are used as fuels. It is important that the combustion of fuels is complete.

(i) Name the gas produced when combustion is **incomplete**.

..... (1)

(ii) Explain why this gas can be dangerous.

.....  
.....  
..... (2)

(Total 9 marks)

Q8



9. Aluminium is extracted from its oxide by electrolysis.

(a) Give two reasons why cryolite is used in the electrolysis of aluminium oxide.

- 1 .....
  - .....
  - 2 .....
  - .....
- (2)

(b) The same material is used for both the positive and negative electrodes.

(i) What is this material?

.....

(1)

(ii) Which gas is produced by electrolysis at the positive electrodes?

.....

(1)

(iii) Explain why these electrodes are replaced at regular intervals.

.....

(1)

(c) Explain why aluminium cannot be extracted using coke in a blast furnace.

.....

.....

(1)

(d) State **one** major cost involved in the extraction of aluminium but **not** in the extraction of iron.

.....

(1)





(e) The uses of aluminium are related to its properties. Complete the table by giving a **different** property for each use.

Use	Property
aeroplanes	
drinks cans	easily moulded
overhead power cables	
pans for cooking food	

(3)

Q9

(Total 10 marks)

**TOTAL FOR SECTION B: 30 MARKS**

**TOTAL FOR PAPER: 75 MARKS**

**END.**



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